

# **CBO TESTIMONY**

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Statement of  
Cindy Williams  
Assistant Director  
National Security Division  
Congressional Budget Office

on  
Modernizing Tactical Aircraft

before the  
Subcommittee on Military Research and Development  
and the  
Subcommittee on Military Procurement  
Committee on National Security  
U.S. House of Representatives

June 27, 1996

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**CONGRESSIONAL BUDGET OFFICE**  
SECOND AND D STREETS, S.W.  
WASHINGTON, D.C. 20515

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE <b>27 JUN 1996</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-1996 to 00-00-1996</b>	
4. TITLE AND SUBTITLE <b>CBO Testimony. Modernizing Tactical Aircraft</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Congressional Budget Office,Ford House Office Building 4th Floor,Second and D Streets, SW,Washington,DC,20515-6925</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES <b>34</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

Chairman Weldon, Chairman Hunter, and Members of the Subcommittees, I am delighted to be here today. At the request of Chairman Weldon and Congressman Spratt, the Congressional Budget Office (CBO) has undertaken a study of our nation's tactical air power. We expect to provide the Committee with the results later this year. Today, I would like to focus on plans to modernize tactical air forces.

The Department of Defense (DoD) plans to acquire three new tactical fighter and attack aircraft for the Air Force, the Navy, and the Marine Corps. The three planes are the F-22 fighter for the Air Force, the F/A-18E/F for the Navy, and the Joint Strike Fighter (JSF)--a multipurpose plane being developed for all three services. DoD expects all three planes to be more capable than the planes they replace.

However, they will also be expensive. DoD plans to buy a total of about 4,400 planes of those three types. CBO estimates that the total cost to develop and acquire them amounts to more than \$350 billion, even without factoring in inflation. Over the 1997-2001 period, DoD says, about \$34 billion (in 1997 dollars; about \$36 billion in current dollars) will be spent for those planes, representing about 9 percent of DoD's planned acquisition spending for the period.

In my testimony, after providing background on these fighter and attack aircraft, I would like to discuss four main points that have emerged from our analysis:

- o U.S. fighter fleets outmatch the fighter fleets of any potential adversary; and
- o DoD plans to purchase enough tactical aircraft to meet the inventory requirements of its fleets through 2020; but
- o The plans assume that tactical aircraft will operate for long periods, and as a result U.S. tactical aircraft fleets will reach unprecedented ages; and finally, but not least,
- o DoD's planned aircraft purchases for fighter fleets may prove to be unaffordable.

I will wrap up my remarks with a brief discussion of several policy alternatives that the Congress may wish to consider in addressing those last two points.

#### DoD's PLANS FOR U.S. TACTICAL AIR FORCES

The Air Force, Navy, and Marines all employ fixed-wing fighter and attack aircraft that fight enemy planes in the air and attack targets on the ground. Current plans--outlined in Secretary of Defense William Perry's 1996 *Annual Report to the President and the Congress*--call for 20 Air Force tactical fighter wings, 11 wings

that operate off the Navy's large deck carriers, and 25 squadrons of fixed-wing fighter and attack aircraft for the Marine Corps. DoD will retain a total of about 3,500 aircraft in inventory to fill out those force levels.

By the end of the year, DoD will operate eight different kinds of fighter and attack aircraft. The bulk of the Air Force fleet consists of F-16s (a small, relatively cheap, multipurpose plane) and F-15s (a larger, more capable, more expensive fighter). The remainder of the Air Force fleet comprises two aircraft dedicated to attacking ground targets: the rugged, tank-killing A-10 and the stealthy F-117.

More than half of the Navy and Marine Corps inventory is made up of F/A-18s, a multipurpose plane (that is, one that performs both fighter and attack roles). It operates both in Navy carrier-based air wings and in fighter squadrons in the Marine Corps. By 1998, only one other fighter or attack aircraft--the highly capable F-14--will operate off the Navy's carrier decks, since the venerable medium-range bomber, the A-6, will have been retired by then. In addition to the F/A-18, the Marine Corps will continue to operate the AV-8B Harrier, which can take off and land in short distances--so-called Short Takeoff/Vertical Landing (STOVL)--and so can fly from the ships that transport marines to amphibious landings.

DoD's plans for modernization call for replacing virtually all of those types of planes with the three aircraft mentioned earlier (see Table 1 for a summary of

procurement costs and quantities for the three planes). By 2020, those three planes will make up more than 80 percent of DoD's aircraft. The department plans to purchase about 4,400 of the new tactical fighter and attack aircraft over the next several decades. The number of aircraft purchased exceeds total requirements because DoD must also buy planes to replace those that are destroyed every year in peacetime accidents. CBO estimates that spending to acquire the new planes will total about \$350 billion (unless otherwise noted, all costs are expressed in 1997 dollars).

## F-22

The Air Force plans to buy the highly capable F-22 fighter to replace its fleet of F-15s. The first four F-22s are scheduled to be bought in 1999. Procurement quantities will increase annually until 2003, when the plane reaches a peak procurement rate of 48. If the current procurement plan remains unchanged, F-22 purchases will continue until 2010, for a total of 438 planes.

The F-22 will add a number of improvements in capability to U.S. fighter fleets. It will be stealthy--and hence more likely to survive in a dense air-defense environment or to be able to shoot down enemy fighters before they can fire back.

**TABLE 1. AIRCRAFT PRODUCTION AND FUNDING ESTIMATES  
FOR NEW AIRCRAFT**

	F-22	F/A-18E/F	Joint Strike Fighter			All	Total
			Air Force	Navy	Marine Corps	Services	
<b>Production Information</b>							
First Production Year <sup>a</sup>	1999	1997	2005	2005	2005	n.a.	n.a.
Number of Aircraft							
Peak production rate (Per year)	48	72	110	12	36	158	n.a.
Total production quantity	438	1,000	2,036	300	642	2,978	4,416 <sup>b</sup>
<b>Prices (Millions of 1997 dollars)</b>							
Recurring Unit Flyaway <sup>c</sup>							
Administration's goal	74	46	30	41	38	n.a.	n.a.
CBO estimates	85	46	45	57	50	n.a.	n.a.
Unit Procurement <sup>d</sup>							
Administration's goal	91	61	45	61	54	n.a.	n.a.
CBO estimates	108	61	63	81	68	n.a.	n.a.
<b>Program Funding Totals (Billions of 1997 dollars)</b>							
Estimates Based on Administration's Goals							
Development	22.7	5.7	9.8	9.8	0.1 <sup>e</sup>	19.7	48.1
Procurement	<u>40.0</u>	<u>61.2</u>	<u>92.2</u>	<u>18.3</u>	<u>34.3</u>	<u>144.8</u>	<u>246.0</u>
Total	62.7	66.9	102.0	28.1	34.4	164.5	294.1
CBO Estimates <sup>f</sup>							
Development	22.7	5.7	10.7	10.7	0.1	21.5	49.9
Procurement	<u>47.3</u>	<u>61.2</u>	<u>129.2</u>	<u>24.4</u>	<u>43.7</u>	<u>197.3</u>	<u>305.8</u>
Total	70.0	66.9	139.9	35.1	43.8	218.8	355.7

SOURCE: Congressional Budget Office based on data from the Department of Defense.

NOTES: n.a. = not applicable.

- a. Year of planned low-rate initial production.
- b. The Royal Navy in the United Kingdom also plans to purchase Joint Strike Fighters.
- c. Excludes nonrecurring production, support items, and initial spare parts. DoD and the services often use this level of aggregation to discuss aircraft prices.
- d. Total procurement funding divided by total production quantity.
- e. Marine Corps development share is listed under Navy. This is Advanced Research Projects Agency funding for the Advanced Short Takeoff/Vertical Landing program, a predecessor to the Joint Advanced Strike Technology program.
- f. Congressional Budget Office estimates assume historical relationships between cost, aircraft weight, and performance.

The F-22 will also cruise at supersonic speeds, without needing to resort to afterburners that use up fuel. Moreover, the F-22 will provide its pilots with sophisticated software that will enable them to be very aware of their situation, telling them, among other things, the locations of relevant targets and threats.

The F-22 will also be an extremely expensive plane. Even if its price grows no more than it already has, the Administration estimates that the F-22 will have a unit procurement cost of \$91 million compared with about \$47 million for the F-15 (see Table 2 for a summary of costs for planes now in the fleet). Acquisition costs, which include the funds to develop and procure the fighter, will total \$63 billion--including \$15.7 billion that DoD has already spent. CBO constructed an estimate for the fighter's price based on cost-estimating relationships (CERs)--historical relationships between price, weight, and capability. CBO's estimates suggest that it might cost even more--perhaps \$108 million per plane.

#### F/A-18E/F

The multipurpose F/A-18 makes up the bulk of the Navy's aircraft fleet and will continue to do so for the foreseeable future. In 1991, the Navy announced plans to develop a new E/F variant of the F/A-18. The E/F version features several modifications: a longer fuselage, a larger wing, and a more powerful engine than are



**TABLE 2. AIRCRAFT PRODUCTION AND FUNDING ESTIMATES  
FOR AIRCRAFT NOW IN THE FLEET**

	F-16 <sup>a</sup>	F-15 <sup>a</sup>	F-18A/B/C/D	AV-8B
<b>Production Information</b>				
First Production Year <sup>b</sup>	1978	1973	1979	1982
Number of Aircraft				
Peak production rate (Per year)	180	108 <sup>c</sup>	84	46
Total production quantity <sup>d</sup>	2,201	1,074	1,015	279
<b>Prices (Millions of 1997 dollars)</b>				
Recurring Unit Flyaway <sup>e</sup>	16	36	29	24
Unit Procurement <sup>f</sup>	23	47	44	34
<b>Program Funding Totals (Billions of 1997 dollars)<sup>g</sup></b>				
Development	4.2	8.4	6.0	2.5
Procurement	<u>51.4</u>	<u>50.2</u>	<u>44.5</u>	<u>2.5</u>
Total	55.6	58.6	50.4	12.0

SOURCE: Congressional Budget Office based on data from the Department of Defense.

NOTE: Numbers may not add to totals because of rounding.

- a. All models.
- b. Low-rate initial production.
- c. Peak rate sustained for only two years (1976 and 1977)
- d. Extracted from last Selected Acquisition Report (SAR) submitted by DoD.
- e. Excludes nonrecurring production, support items, and initial spare parts. DoD and the services often use this level of aggregation to discuss aircraft prices.
- f. Total procurement funding divided by total production quantity.
- g. Extracted from last SAR submitted by DoD; dollars escalated to 1997 dollars from constant base-year dollars reported in SAR.

on the current C/D model. As a result of the design changes, the plane should be able to carry more weapons than the C/D version or to carry a combat load about 40 percent farther. The plane's new engine should also permit the heavier model to be as agile in flight as were earlier models. The F/A-18's producer is also suggesting that the new plane will be stealthier than older models and thus potentially more survivable in high-threat situations.

The Navy expects to buy 1,000 F/A-18E/Fs beginning next year and continuing through 2015. Since it contains such a large number of planes, the price tag of the F/A-18E/F program exceeds that of the F-22, totaling about \$67 billion, even though its unit cost is expected to be lower. CBO's analysis suggests that this estimate is in line with the costs of earlier-model F/A-18s--after adjusting for the E/F's heavier weight.

### Joint Strike Fighter

The largest of DoD's development efforts for the three fighter and attack aircraft is for the Joint Strike Fighter--formerly called the Joint Advanced Strike Technology (JAST) program. The JSF is also the plane that is in the earliest stage of development and therefore the least well defined.

The following discussion is based on guidelines for contractors that the JSF program office provided in soliciting development proposals. Goals for performance, cost, and schedule will probably change many times over the life of the development program. Nonetheless, they represent DoD's current thinking about this large development effort.

When DoD announced the JAST program in its Bottom-Up Review, the program was presented as replacing two design efforts--the Multirole Fighter (an F-16 replacement for the Air Force) and the A/FX (an F-14 and A-6 replacement for the Navy). DoD suggested that the other programs would be difficult to afford and that it would emphasize keeping the price down in its new fighter development effort. As a result of Congressional direction, the JSF program also picked up the task of replacing the Marine Corps's STOVL plane--the AV-8B.

Despite the differences in the planes it will replace and the disparity in their missions, the JSF program office expects the JSF's variants to have a high degree of commonality, perhaps as much as 80 percent. According to statements by the program office, since DoD saves money when it buys weapons in bulk, such a high level of commonality will keep JSF prices down. The program will also pursue other strategies to reduce costs. Indeed, one of the program's design requirements is to meet specified unit flyaway costs (a level of spending for aircraft that excludes

development, initial spare parts, and other items that are included in total program costs).

The JSF program office indicates that it may begin buying the fighter in 2005 with initial purchases of 12 planes, divided evenly among the three services. Annual procurement rates would grow to a peak of 158 aircraft. Despite reaching rates that seem high today, when fighter purchases number in the single digits, the huge planned procurement total (about 3,000 planes) means JSF purchases would not be complete until 2030.

DoD has not yet given an estimate for the JSF's total program costs to the Congress. But the program office has given estimates of the unit flyaway costs it is willing to pay for the fighter, as part of its instructions to aerospace companies competing for the contract to develop the concept. According to the program office, it expected to pay \$28 million for the Air Force variant, up to \$35 million for the Marine Corps version, and \$38 million for the Navy variant (those goals are expressed in 1994 dollars).

Since unit flyaway costs do not represent all of the procurement funding actually required to acquire an aircraft, CBO also developed unit procurement costs that include funding that will be needed for spare parts, support equipment, and simulators. In 1997 dollars, DoD's goals for flyaway costs translate to average unit

procurement costs of about \$45 million for the Air Force's JSF, \$54 million for the Marine Corps's variant, and \$61 million for the Navy's design. Procurement funding to achieve DoD's goals totals \$145 billion. CBO also estimated 1997 development costs for the program based on an estimate from the Joint Program Office. Combining those estimates leads to a total acquisition cost, based on DoD's goals, of \$165 billion.

The program office's goals for costs appear low given the performance goals for the JSF. Consequently, CBO also estimated unit flyaway costs, based on historical cost-estimating relationships, and used those estimates to construct unit procurement costs. CBO's CER estimate suggests that Air Force and Marine Corps JSFs may well cost about \$63 million and \$68 million, respectively. The Navy's more capable plane may cost about \$81 million. CBO estimated that the acquisition cost--for development and procurement funding--could total \$219 billion--about 60 percent more than the combined cost of the F/A-18E/F and F-22 programs.

#### U.S. FIGHTER FLEETS OUTMATCH THE FIGHTER FLEETS OF ANY POTENTIAL ADVERSARY

The need to modernize U.S. forces depends in part on the size and capability of the fighter fleets of potentially threatening countries. It also depends on their air defense capabilities and their plans for modernization. Yet, as a recent RAND publication,

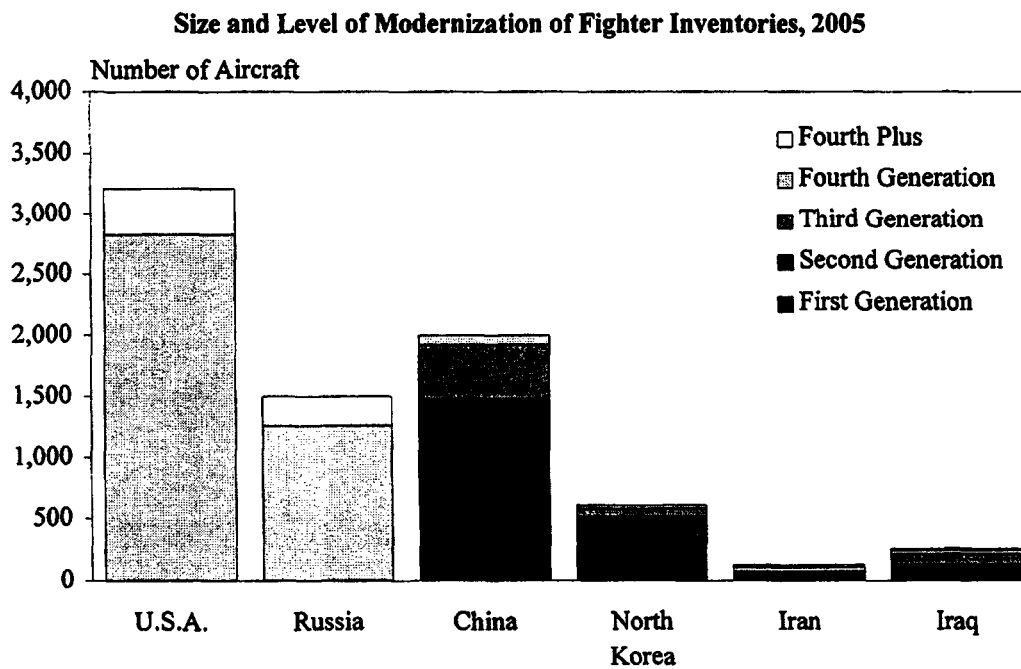
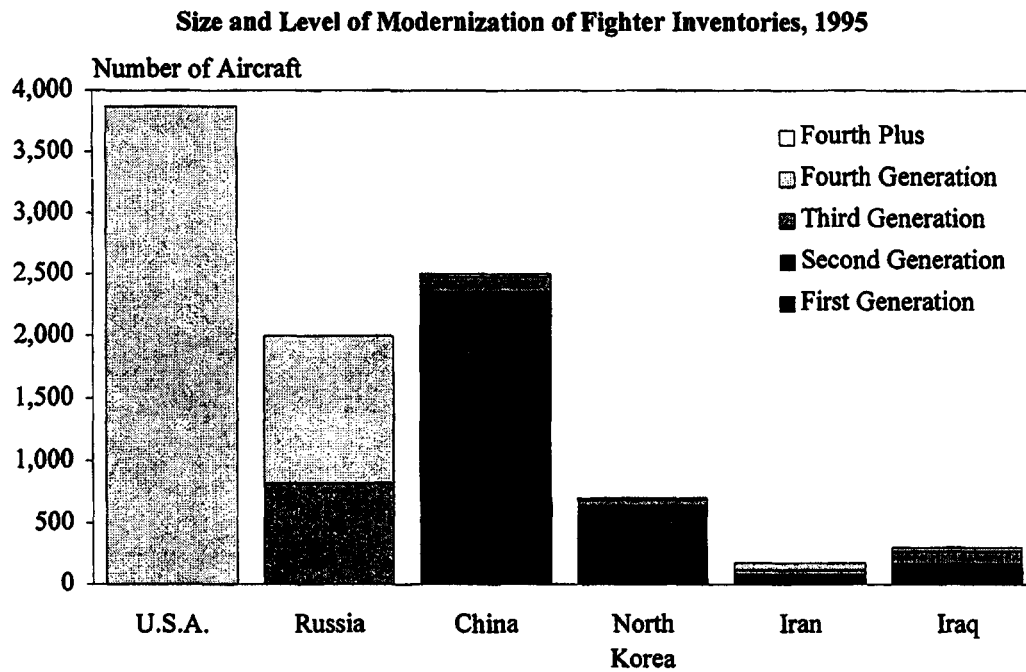
*Trends in the Global Balance of Airpower*, argues, the United States depends on its airpower to counterbalance enemy ground forces, particularly early in a conflict. Consequently, planners must look beyond balancing enemy fighter and air-defense capability to preserving considerable U.S. superiority in the air.

One problem today with making comparisons between U.S. forces and those of other countries is the uncertainty about which countries constitute potential threats, in contrast to the bipolarity of the Cold War period. The Clinton Administration built on the Bush Administration's strategy of being able to fight in two major regional conflicts at the same time. Planners often assume that those conflicts would be in Southwest Asia--with Iraq or Iran--and on the Korean peninsula with North Korea. Russia and China are also considered by some to be potential threats and possess considerable combat potential.

### Trends in Future Fighters

CBO used a recently released Office of Naval Intelligence publication on the size and modernization of the fighter fleets of those five countries as a source for this discussion (see Figure 1). The Navy paper includes estimates of total fighter inventories in each country and also a percentage breakout of those inventories into "generations" that reflect the level of technology incorporated in the aircraft. The

FIGURE 1. TACTICAL FIGHTERS IN SELECTED COUNTRIES



SOURCE: Congressional Budget Office using data from Office of Naval Intelligence, *Worldwide Challenges to Naval Strike Warfare* (January 1996).

Navy presented estimates for 1985, 1995, and 2005. CBO uses those estimates in its forthcoming study, since they are the only unclassified U.S. government projections for foreign fighters.

The Navy's analysis suggests that not one of those countries has an aircraft inventory that approaches U.S. totals. The largest inventories--those in China or Russia--amount to two-thirds the size of U.S. inventories or less. The Navy's estimates exclude dedicated ground-attack aircraft that Navy personnel argue do not threaten naval assets. For that comparison, CBO has therefore excluded dedicated ground-attack planes in U.S. inventories--including the A-6, AV-8B, A-10, F-111, and F-117--from its counts (see Figure 1). Including those aircraft on both sides would probably make the balance even more favorable to the United States.

Compared with U.S. plans to keep a fleet of more than 3,000 aircraft, the inventories of the three countries commonly associated with the Administration's major regional contingencies--Iran, Iraq, and North Korea--have a total of only about 1,200 planes. Moreover, the Navy projects that total inventories in those countries will shrink to less than 1,000 planes by 2005. The fleets of those countries are also not very capable and contain aircraft designed many decades ago. In 1995, they contained only about 100 planes that were the same generation as today's U.S. fighters. By 2005, only about 120 of those planes might come from the same design



era of today's U.S. fighters or be of the same vintage as the planes DoD wishes to purchase.

### Air-Defense Modernization

Since U.S. planes may be challenged by ground-based air-defense systems as well as fighters, service planners worry about modernization of air defenses as well. No unclassified government forecasts are available for future air defenses--similar to the Navy's fighter analysis--in potentially hostile countries. But both the Air Force and the Navy have expressed concerns about the possibility of such modernization taking place.

An argument for purchasing stealthy planes such as the F-22, the JSF, and--to a lesser extent--the F/A-18E/F is that they would have a better chance of surviving to attack targets in areas with dense air defense. Improving ground-based air defenses may be a less costly way for potential adversaries to defend themselves against U.S. fighters. DoD is particularly concerned that such adversaries could easily buy cheap "man portable" weapons--namely, weapons that ground troops can carry--that many defense experts expect to proliferate in the future. Of the 25 friendly fighters lost in the war with Iraq, 18 were lost either to those weapons or to the more costly antiaircraft artillery. But both the portable weapons and artillery

have limited ranges. Pilots may be able to fly at altitudes that keep their planes--particularly those that can launch precision-guided weapons--out of the range of those weapons.

Improvements in longer-range surface-to-air missile (SAM) systems--particularly the possibility that hostile countries might acquire the Russian-built SA-12 system--are more likely to put the current generation of aircraft at risk. As it is, the Russian-built systems can fire at aircraft from considerable distances. Improving missile speed and tracking might make them highly dangerous to conventional planes.

Older SAM systems were not particularly lethal in the war with Iraq--shooting down only six planes. Less wealthy countries may find it too expensive to purchase the extensive air-defense networks that make newer systems so capable. Learning to use sophisticated linked networks could also be challenging and expensive for them. Furthermore, developing long-range standoff antiradiation missiles may enable non- or less stealthy U.S. aircraft to develop tactics to attack those SAMs. Enemy SAMs may also make good targets for U.S. cruise missiles.

## U.S. Dependence on Air Power

Even if threats do not grow or become more numerous, continuing to field large numbers of highly capable U.S. aircraft offers a number of advantages. For one thing, the United States relies on air power to offset the capabilities of enemy ground forces. Because of that reliance, simply offsetting enemy fighter and air-defense capabilities is not sufficient. Also, aircraft, which can fly to a conflict and require less support equipment than heavy ground forces, can provide firepower earlier in a conflict than any but the lightest Army forces. If early-arriving air power is able to slow or stop attacking forces, it can make rolling back enemy forces easier.

Wars emphasizing the use of airpower may be less likely to result in numerous U.S. casualties. That is always an important concern, but perhaps even more so in today's political environment. During the war with Iraq, the United States engaged in a prolonged bombing campaign that killed or disabled large numbers of enemy forces before beginning the ground offensive. That campaign probably made the task of ground combat forces much easier and saved U.S. lives. For all of those reasons, U.S. leaders may choose to keep large, capable fighter inventories.

## DoD'S PLANS MEET INVENTORY REQUIREMENTS THROUGH 2020

CBO projected the size of future U.S. fighter and attack inventories for the 1997-2020 period, using DoD's plans to purchase and retire aircraft. We compared those estimates with the requirements needed to meet the Administration's current goals for fighter forces. According to CBO's analysis, DoD should be able to meet its requirements for force structure.

CBO projects that DoD's planned purchases of F-22s, F/A-18E/Fs, and JSFs should make up most of the shortfall created as the three services retire their older aircraft. At the end of 1997, the Air Force will have about 2,700 planes in its inventory. It needs about 2,050 planes to meet the requirements for its 20 wings and for six squadrons of air-defense fighters in the Air National Guard. Today's surplus of about 600 planes will drop sharply as a result of rapid retirement of early F-16 models. Consequently, by the beginning of the next decade, the Air Force will have a surplus of about 200 planes. Planned procurement will let the service avoid shortages of more than 200 planes for the 2002-2020 period.

The Navy currently has about the number of planes it needs to meet its requirement of around 1,500. That number will slip to 1,400 by 1998. At that time, all carriers will operate with wings that contain only 50 fighter and attack aircraft (compared with the 60-plane wings found on some carrier decks today). The Navy

will experience modest shortages of fewer than 150 planes during the first decade of the 21st century.

#### U.S. TACTICAL AIRCRAFT FLEETS WILL REACH UNPRECEDENTED AGES

DoD's plans for aircraft purchases should permit it to support its force goals. Nonetheless, it will need to keep planes in the fleet for unusually long periods to do so. The large number of older aircraft will drive the average age of DoD's fleets to unprecedented levels.

CBO's forecasts of future inventories depends on a number of assumptions made by the services. One particularly important assumption is service life--a projection of the number of hours a plane will be able to fly before it experiences structural fatigue. Service planners translate those numbers into a forecast of when the planes in today's fleets will retire. Both the Air Force and the Navy are expecting to retain planes longer than they have in the past. Historically, DoD has planned to retire fighter and attack aircraft when they reach about 20 years of age. But current plans call for retaining planes until they are well into their 30s, and in some cases even 40s.

The military's estimates of service life may prove to be accurate. In designing the planes that are in the fleet today, DoD may have placed more emphasis on retaining planes for longer periods than it did for past generations of aircraft. Also, improvements in computer modeling and simulation--which lie at the heart of those estimates--may enable engineers to construct better estimates than they did in the past of how long planes will last.

Nevertheless, DoD could also be overly optimistic. In several recent situations, DoD retired planes that it had originally planned to keep for long periods. One example is the Air Force's F-16A/B model.

Several years ago, the Air Force expected the entire F-16 fleet--A/B and C/D models--to last 8,000 flying hours (about 30 years at expected annual flight rates). But recently the Air Force discovered that the F-16A/B fleet was experiencing unanticipated structural fatigue. After studying the issue, the Air Force decided that repairing the F-16 would be more expensive than it was worth and decided to retire the plane after 4,000 flight hours. Some analysts have argued that similar problems may be encountered with the F-16C/D, since testing for fatigue performed during the plane's development examined only a portion of the airframe.

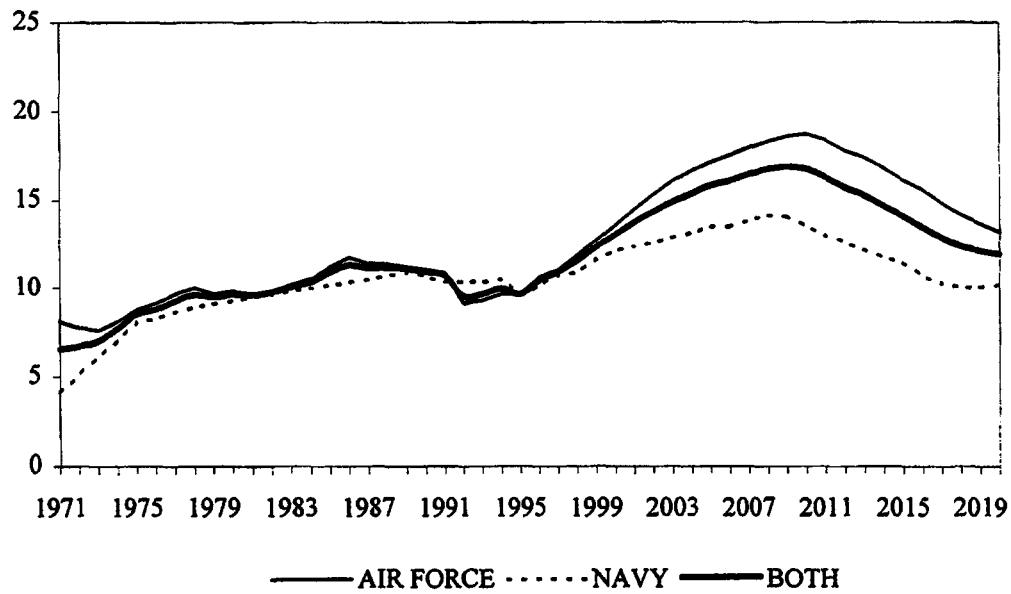
Unfortunately, the F-16 is not an isolated example. The Navy also recently accelerated the A-6's retirement. In addition, the Air Force changed its plans for the

long-range F-111, shortening its expected service life. Those two examples may be based more on a desire to cut operating costs or worries about vulnerability to enemy air defenses than on misjudgments about structural strength.

Planned service lives are longer than they have been in the past. As a result, fleets will age. Navy and Air Force fleets are, on average, about 10 years old today (see Figure 2). They will age rapidly over the next 10 to 15 years of low planned purchases. Average ages in the Air Force will be higher than those in the Navy and Marine Corps, exceeding 15 years by around the middle of the next decade. That average age will climb to 19 years by 2010, before it begins to decline as large numbers of Joint Strike Fighters reach operational status. The Navy's fleet--which will receive infusions of large deliveries of F/A-18E/Fs in the early years of the next decade--will remain relatively younger, reaching an average age of about 14 years around 2005. It will remain at that level until it begins declining in 2010, when the Navy too receives JSF deliveries in quantity.

DoD uses the average age of its aircraft fleet as a measure of modernization and a proxy for obsolescence of large blocks of the fleet. In the past, DoD officials have also argued that aging fleets will be less capable in combat, since enemy fleets and air defenses will modernize. The services also express concern that older fleets will be more difficult to operate and more expensive to maintain.

FIGURE 2. HISTORICAL AND PROJECTED AVERAGE AGES OF FIGHTER  
AND ATTACK AIRCRAFT, 1971-2020



SOURCE: Department of Defense, *Annual Report to the President and the Congress* (March 1996) and Congressional Budget Office.



CBO estimates that the ages of the fleet in the Administration's plans will be greater than those of U.S. tactical fighter fleets at any point in history--at least since the advent of the jet engine. According to DoD's estimates, the Air Force fighter fleet had an average age of about eight years in the 1970s and about 10 years in the 1980s. With an average age of less than five years at the beginning of the 1970s, Navy inventories aged to about eight years in the late 1970s and to about 10 years in the 1980s.

Yet, as with increases in expected service life that underlie them, such trends in aging may be of less concern than they were during the Cold War. They also may be less of a problem if one believes that estimates of service life are more accurate than they have been in the past because of better modeling.

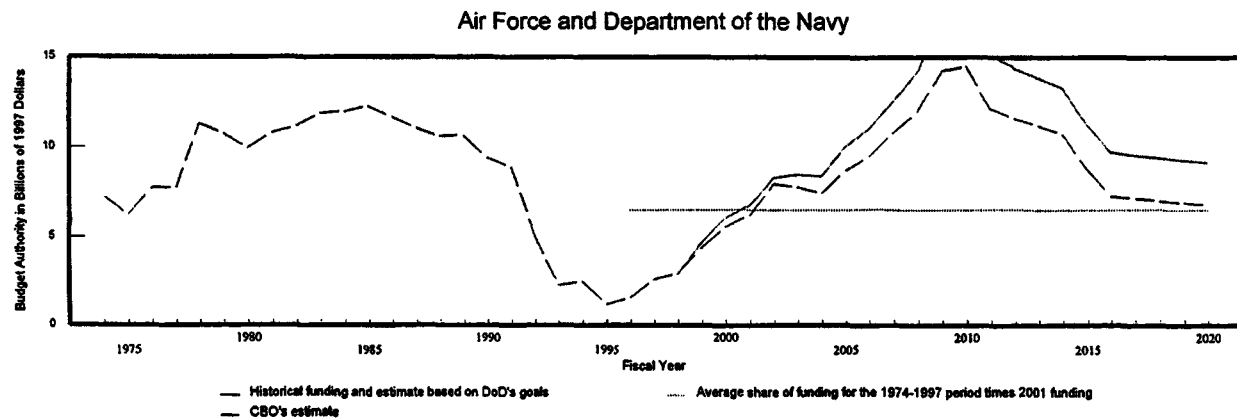
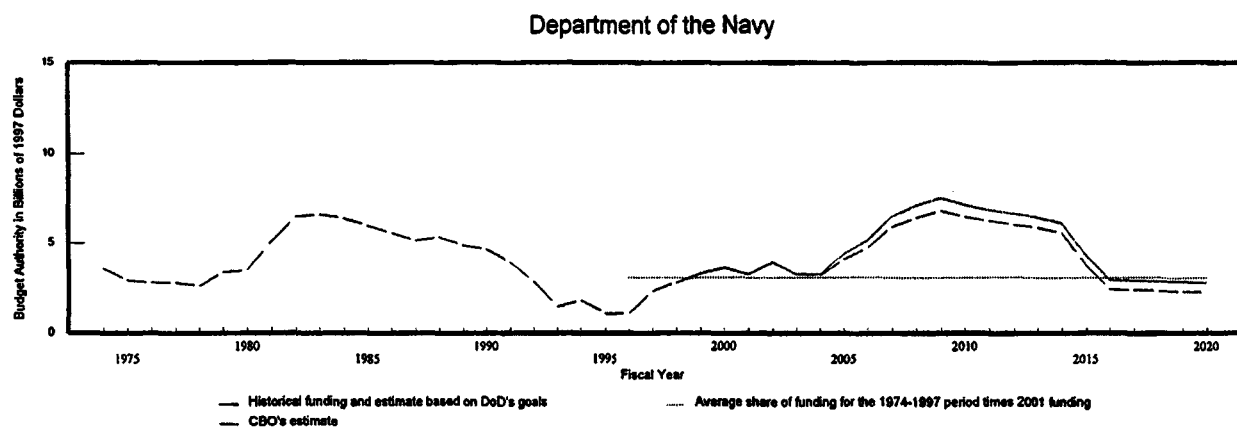
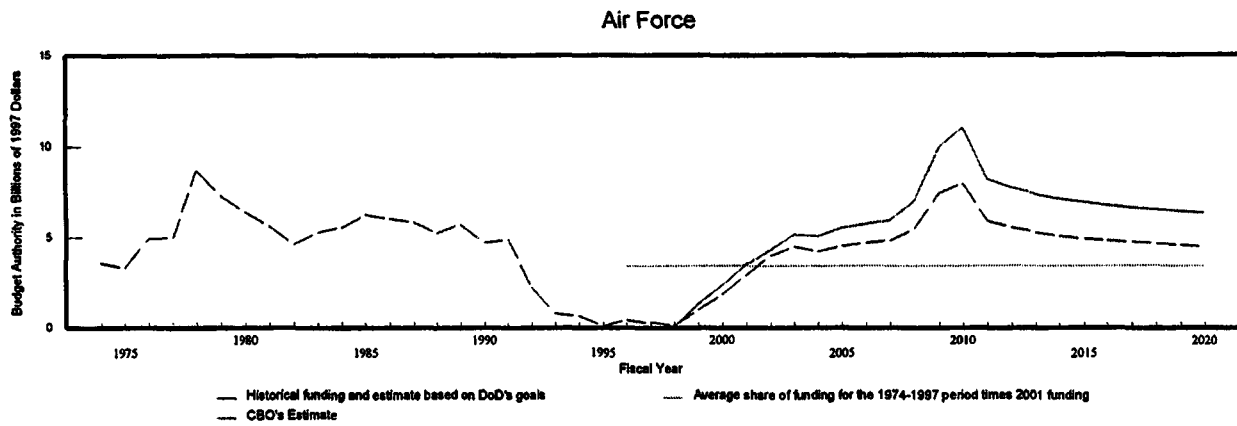
Nonetheless, aging fleets suggest that future Administrations will have less flexibility in responding to unanticipated structural fatigue problems such as those recently encountered with the F-16A/B. If modifications become necessary to keep old planes in the fleet, they could add substantially to funding requirements for fighters. For example, the Marine Corps's "remanufacture" of the AV-8B fleet (an extensive modification program to update and extend the plane's service life) costs about \$30 million on average, almost as much as the plane cost to buy originally.

## DoD'S PLANS MAY PROVE TO BE UNAFFORDABLE

If problems develop with the aging fleet, adding to funding for fighter planes could pose serious difficulties. The Administration's current plans to modernize will already be costly. CBO estimated future funding required for purchases of the three new planes in the Administration's current plan. It then compared that amount with the funding that might be available if DoD allocated the same share of its future budget to fighter and attack aircraft purchases as in the past. For that base case, CBO's estimates of fighter costs are based on DoD's goals rather than on CBO's CER estimates.

On average, the Air Force and the Navy spent about 4.6 percent and 4 percent, respectively, of their annual budgets on purchasing fighters over the 1974-1997 period. CBO applied those percentages to the Administration's plans for service budgets in 2001--the last year of currently available plans. That estimate suggests that the services might have about \$3.5 billion and \$3.1 billion, respectively, or a total of about \$6.6 billion, to spend for fighters each year (see Figure 3). The current plan would require spending an average of about \$9.6 billion annually over the 2002-2020 period to buy fighter and attack aircraft--that is, almost \$3 billion more than might be available if the defense budget remained level in real terms after 2001 and fighters got the same share as previously.

Figure 3. Historical and Projected Funding for Fighter and Attack Aircraft



SOURCE: Congressional Budget Office.

### Assumptions That Could Make Plans More Affordable

Making different assumptions might yield different conclusions--namely, that more money would be available for future fighter procurement. One might argue, for example, that comparing future funding for fighter and attack aircraft with past shares allocated to them could be pessimistic. DoD could choose to allocate a larger share of its budget to fighters--cutting spending for other parts of its budget. If even modestly increased percentages of service budgets were given to funding tactical fighter aircraft, DoD might be able to afford its current plans.

However, DoD has other modernization programs planned. For example, the Navy expects to purchase 10.6 ships a year on average during the 2002-2020 period--about twice as many as it plans to purchase during the 1997-2001 period. In addition, the Army plans a helicopter modernization program that would require double today's spending on helicopters during the first decade of the next century.

One could also assume that total defense budgets would increase. For the scenario discussed above, CBO assumed that DoD budgets would receive no real increases in funding beyond 2001. A look at past budgets suggests that defense budgets have never gone through such a long period with no growth in funding. As a result, future budgets may indeed grow. In fact, if allocated to purchases of tactical

fighters, even modest real increases in DoD funding could make the current plans more affordable.

#### Assumptions That Could Make Plans Less Affordable

Other assumptions would darken the outlook for affordability. DoD's budgets could decline. Also, the department could spend less on procurement accounts in the future than it did over the historical period of CBO's analysis. Moreover, fighter planes could lose their current share of the budget to other weapons. Finally, they could cost more to acquire than DoD's goals would imply.

Defense budgets are at least as likely to decrease in real terms as to grow. For example, in the next decade if the Congress and future Administrations make tax cuts while reaching and retaining a balanced budget, defense may receive real reductions. Indeed, the budget resolution--the Congress's current road map for federal spending and revenues into the next century--assumes real declines in defense funding authority for several years. Also, other portions of the budget may put pressure on future defense budgets. Unless Medicare and Social Security are changed substantially, the aging baby-boom generation will increase funding needs for those programs during the same period that requirements for fighter purchases are growing. Perhaps for all those reasons, at least one industry forecast--prepared by the

Electronics Industry Association--accords high probability to forecasts of real declines in DoD's funding around the turn of the century and beyond.

Procurement accounts could also receive smaller shares. CBO's analysis implicitly assumes that procurement accounts return to the shares they have received historically. But that goal may be difficult to achieve. Not surprisingly, during the "procurement holiday," procurement funding received historically low shares. It amounts to only about 16 percent of the Administration's 1997 budget request, in contrast to about 23 percent in 1980, 33 percent in 1985, and 26 percent in 1990.

A number of DoD officials have pointed out that they intend to increase spending on procurement during the next five years, ending with a total of \$60 billion in 2001 (in current dollars)--about 40 percent higher than today's level. But even if they succeeded, and it might be tough, procurement would still amount to only about 22 percent of the budget--considerably more than today but considerably less than it received during past years. If purchases of fighter and attack planes received their historical share of that reduced procurement share, DoD might have only about \$5.5 billion to spend on them each year, about \$1 billion less than CBO assumed above.

Achieving even the increases in procurement funding in the Administration's plans may be difficult. Since the defense budget in those plans is no higher in real terms in 2001 than it is today, the increase in procurement comes at the expense of

cuts elsewhere in the budget--partly out of development and military construction funding but also out of operating funds. Those funds pay for a number of things, including sums to operate and maintain DoD's forces and costs for DoD's infrastructure. But most of the planned cuts in forces have already been made. DoD will already need to pare infrastructure and trim operating costs significantly to accomplish its plans.

To increase procurement above currently planned levels, even more aggressive trimming of operating accounts would be needed. But recent trends in operating funds suggests that they are increasing rather than decreasing. In addition, the Administration and the Congress have found it difficult to consolidate operations and close bases in the past. Therefore, the hope that procurement could wrest even larger shares of future budgets is unlikely to be fulfilled unless future Administrations and Congresses make significant changes in the way DoD is structured and provides services, or make further large cuts in forces.

As I mentioned earlier, purchases of fighter planes could lose out to ships and helicopters. Increased funding for space-based programs, long-range bombers, or airlift aircraft may come out of funds for fighter planes. Although some mission areas--such as antisubmarine warfare--have received reduced emphasis at the end of the Cold War, others, such as mobility, have increased in importance.

DoD may also need to pay more for the planes it purchases. DoD's price goals--particularly for the Joint Strike Fighter--assume that the department will be able to break away from historical relationships between cost and capability and aircraft weight. DoD's JSF estimate assumes that it will get a number of improvements in performance, including stealth, with no cost penalty. Since the Administration argues that it will place considerable emphasis on keeping prices down in its design programs, CBO has included DoD's estimates. Yet history offers little hope that such an endeavor might succeed.

CBO also estimated prices for those planes using historical cost-estimating relationships. Its analysis suggests that only one plane, the F/A-18E/F, has costs that reflect historical CERs. The F-22's price is modestly underestimated and could rise to about \$108 million if CERs prove to be better price predictors than the estimating methods DoD used.

However, the biggest change would be in the cost of the Joint Strike Fighters. Total procurement costs could be about 35 percent higher than current estimates--rising to about \$197 billion. CBO's higher, but more realistic, estimate would suggest that DoD may need about \$11.8 billion per year--or 75 percent more than the \$6.6 billion historical share.



## ILLUSTRATIVE ALTERNATIVES

Since the Administration's plan is likely to be difficult to afford, the Congress and DoD may wish to consider alternatives. A forthcoming CBO study for this Subcommittee will evaluate several alternatives in some detail.

One way to keep force size up and avoid substantial fleet aging, while holding funding down, would be to continue purchasing aircraft that are already in production--and cancel or scale back the development programs. For example, the General Accounting Office has proposed that DoD continue to purchase the current-generation F/A-18C/D instead of buying the E/F. This Committee's authorization bill included such an option in an independent study of alternatives to current plans for fighter modernization. Moreover, keeping the current generation of planes in production may be acceptable to people who feel that extensive modernization on the part of potential adversaries is unlikely.

Another alternative would be to restructure planned development. For example, DoD might be able to avoid some research and development costs by designing variants of planes that are farther along in the development process and purchasing more of them. Such a strategy--similar to the Navy's approach when it decided to modify the F/A-18E/F and use it for a larger portion of its carrier-based aviation fleet instead of building a new plane--would probably be almost as costly

as CBO's estimate based on DoD's price goals. But it would entail less risk of prices escalating. It would, moreover, permit DoD to field a highly capable fleet.

Alternatives that emphasize modernization but make cuts in forces also merit attention. Some critics of the size of DoD's air forces have argued that considerable duplication of effort exists in that area. DoD could place priorities on its force requirements and consequently modernize and retain only the highest-priority forces. Alternatively, DoD could pursue all of its efforts to modernize, but purchase all planes at reduced quantities and accept whatever force reductions occur. Some decisionmakers perceive such a strategy as the fairest approach to making programmatic funding cuts, since it taxes all participants equally. But since the unit price rises when fewer planes are purchased than anticipated, that option provides the least capability for the price of any alternative considered.

## CONCLUSION

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To summarize, CBO's analysis suggests that DoD's current plans for fighter purchases pose a number of problems. If they actually occurred, planned purchases would meet requirements. They would also produce a very capable fleet. But CBO's analysis suggests that they may not be affordable and will probably need to be scaled back in some way. The aging of the fleet is also worrisome, suggesting as it does

that future leaders could have less flexibility in dealing with funding cuts. They may need more money and have less.

At the same time, U.S. fighter fleets are considerably larger and more modern than those of potentially threatening countries. That situation suggests that alternatives that accept more modest modernization, smaller improvements in the capabilities of future fighters, or smaller forces may be acceptable.